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PATENT ABSTRACTS OF JAPAN

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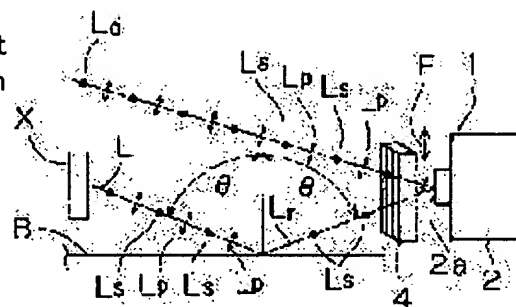
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(54) PERIPHERAL IMAGE PICKUP DEVICE FOR VEHICLE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a peripheral image pickup device capable of preventing the phenomenon that a scenery is reflected on a surface of a vehicle in a picked up image.

SOLUTION: In this peripheral image pickup device for a vehicle for picking up the peripheral image of the vehicle including a body B, a polarizing member 4 is arranged on the way of an optical path, through which the light L_r reflected by the body B enters a picked up image 2a. Polarizing direction of the polarizing member 4 is vertical to the surface of the body B.



LEGAL STATUS

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CLAIMS

[Claim(s)]

[Claim 1] Circumference image pick-up equipment for cars equipped with the polarization member which it is [member] circumference image pick-up equipment for cars which picturizes a car circumference image including the front face of a car, and decreases the quantity of light of the image sensor which has an image pick-up side, and said reflected light which the reflected light of the front face of said car is arranged in said image pick-up side in the middle of the optical path which will carry out incidence, and carries out incidence to said image pick-up side.

[Claim 2] Circumference image pick-up equipment for cars with which it is circumference image pick-up equipment for cars according to claim 1, and the oscillating direction of S polarization component of the light which it will be reflected on the polarization direction of said polarization member and the front face of said car, and will carry out incidence to said image pick-up side intersects perpendicularly substantially.

[Claim 3] Circumference image pick-up equipment for cars with which it is circumference image pick-up equipment for cars according to claim 1, and the polarization direction of said polarization member and the direction of a field of the front face of the car picturized by said image sensor intersect perpendicularly substantially.

[Claim 4] It is circumference image pick-up equipment for cars which is circumference image pick-up equipment for cars according to claim 1 to 3, and picturizes the car circumference image with which said image sensor includes the front face of a car through an optical-system reflective means.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the circumference image pick-up equipment for cars for picturizing scenes of the car circumference, such as an automobile.

[0002]

[Description of the Prior Art] In order to picturize the conventional, for example, car, circumference scene and to enable the display of this in the vehicle interior of a room, image pick-up equipments, such as a CCD camera, are installed in the circumference of the body of a car.

[0003] As an example of installation of image pick-up equipment, as shown in drawing 6 and drawing 7, the example of a mounting beam is given in the lower part of the door mirror 111 of Car A by the back slanting flat position in image pick-up equipment 100.

[0004] The field of slanting back facing down is picturized from a door mirror 111 by this image pick-up equipment 100.

[0005]

[Problem(s) to be Solved by the Invention] However, when image pick-up equipment 100 is installed as mentioned above, the body B of Car A is contained in an image pick-up image. For example, if a certain body X exists behind Car A as shown in drawing 6 and drawing 7, as shown in drawing 8 and drawing 9, the light L from the body X concerned will reflect on the front face (painted surface) of Body B, incidence will be carried out to the image pick-up side of image pick-up equipment 100, and the body Xm concerned will be reflected to the body B in the image picturized with image pick-up equipment 100. Thus, when a car circumference image is picturized so that the body B front face of Car A may be included with image pick-up equipment 100, the light L reflected on the front face of Body B will carry out incidence to image pick-up equipment 100, and will be remarkably inferior to the visibility over an image pick-up image.

[0006] Then, the technical problem of this invention is in the car circumference image picturized so that the front face of a car might be included to offer the circumference image pick-up equipment for cars which can control the effect of the reflected light from the front face of a car.

[0007]

[Means for Solving the Problem] It is circumference image pick-up equipment for cars which picturizes the car circumference image with which the circumference image pick-up equipment for cars according to claim 1 includes the front face of a car that the above-mentioned technical problem should be solved, and it has the polarization member which decreases the quantity of light of the image sensor which has an image pick-up side, and said reflected light which the reflected light of the front face of said car is arranged in said image pick-up side in the middle of the optical path which will carry out incidence, and carries out incidence to said image pick-up side.

[0008] In addition, it is good for the oscillating direction of S polarization component of a light according to claim 2 which it will be reflected on the polarization direction of said polarization member and the front face of said car, and will carry out incidence to said image pick-up side like to intersect perpendicularly substantially.

[0009] Moreover, the direction of a field of the front face of the car picturized by the polarization direction of said polarization member and said image sensor like according to claim 3 may intersect perpendicularly substantially.

[0010] Furthermore, the car circumference image according to claim 4 with which said image sensor includes the front face of a car through an optical-system reflective means like may be picturized.

[0011]

[Embodiment of the Invention] Hereafter, the circumference image pick-up equipment for cars concerning the gestalt of

implementation of this invention is explained.

[0012] As shown in drawing 1, this circumference image pick-up equipment 1 for cars picturizes a car circumference image including the front face of a car, and is equipped with an image sensor 2 and the polarization member 4.

[0013] A CCD camera, a CMOS camera, etc. are used as an image sensor 2. An image sensor 2 is attached in a car with the position which can picturize a car circumference image including the front face of a car. With the gestalt of this operation, since the case where image pick-up equipment 1 is attached in the lower part of a door mirror 111 by the back slanting flat position as well as the example of installation shown in drawing 6 and drawing 7 is assumed, as shown in drawing 2, the image which is the field of slanting back facing down from a door mirror 111, and contains the body B of a car side face with image pick-up equipment 1 is picturized. In addition, an image pick-up image is displayed on the display of the vehicle interior of a room, and the check of the part which serves as a dead angle from an operator is presented with it. In addition, the example of installation of this image pick-up equipment 1 is not restricted to the example shown in drawing 6 and drawing 7. For example, also when picturizing the car front image which contains the bonnet concerned with an image sensor 2 when image pick-up equipment 1 is installed on a bonnet, it can apply.

[0014] Polarizers, such as a common polarizing plate, are used as a polarization member 4. This polarization member 4 is arranged in the middle of the optical path which the light L_r reflected with said body B will carry out incidence to image pick-up side 2a. With the gestalt of this operation, the polarization member 4 is formed in the location which counters image pick-up side 2a of an image sensor 2. In addition, an image sensor 2 and the polarization member 4 are attached in a car in the condition of having held in the case inside of the body of a graphic display abbreviation, and having been fixed with the predetermined position.

[0015] Moreover, let the polarization member 4 be the position made to intersect perpendicularly substantially to the oscillating direction (direction vertical to the normal of Body B, and the direction of a field including the travelling direction of Light L (drawing 1 the direction of space)) of S polarization component of the light L_r which will be reflected on the body B front face of a car, and will carry out incidence of the polarization direction (the direction of an optical axis of a polarization member) E to image pick-up side 2a.

[0016] That is, when a certain body X exists behind Car A (refer to drawing 6 and drawing 7), it reflects on the front face of Body B, and the light L from Body X tends to carry out incidence of this reflected light L_r to image pick-up side 2a of an image sensor 2. Here, when Light L reflects with Body B and tends to carry out incidence to image pick-up side 2a, generally, the angle of reflection θ of the reflected light L_r is large, and the principal component of the reflected light L_r turns into S polarization component L_s . Then, if the polarization member 4 is arranged as the oscillating direction of S polarization component L_s of said reflected light L_r and the polarization direction E of the polarization member 4 are made to cross at right angles substantially, it will be shaded by the polarization member 4 and S polarization component of the reflected light L_r will decline as a result and the whole reflected light L_r .

[0017] In addition, he is trying for the polarization direction E of the polarization member 4 to intersect perpendicularly substantially with the gestalt of this operation to the direction of a field of the part which will be picturized with an image sensor 2 among Bodies B.

[0018] According to the circumference image pick-up equipment 1 for cars constituted as mentioned above, the field of slanting back facing down is picturized from a door mirror 111 by the image sensor 2 (refer to drawing 6). Here, if Body X exists behind for example, the car A, as shown in an image pick-up image at drawing 2, the body X concerned and Body B will be picturized. Moreover, if the light L from Body X reflects on the front face of Body B, the principal component of the reflected light L_r will turn into S polarization component L_s . For this reason, in case the reflected light L_r passes the polarization member 4, the reflected light L_r concerned is decreased greatly. Therefore, the reflected light L_r by Body B can be reduced, it can carry out preventing a reflect lump of the scene to the body in an image pick-up image etc., and the effect of the reflected light from the front face of a car can be controlled.

[0019] Thereby, when for example, an image pick-up image is displayed on the display of the vehicle interior of a room, the concrete effectiveness that an operator's check by looking becomes easy can be acquired.

[0020] Since the light L_d which incidentally carries out incidence to direct image pick-up side 2a from the cars circumference, such as Body X, without reflecting with Body B is the light L_d which does not have a bias in the oscillating direction, other components (P polarization component L_p) which are not decreased by the polarization member 4 pass the polarization member 4, and carry out incidence of it to image pick-up side 2a of an image sensor 2. Therefore, it is picturized satisfactory at all except the projection lump resulting from the reflected light L_r of Body B.

[0021] in addition, image pick-up equipment 1B of the modification 1 shown in drawing 3 as a polarization member 4 -- you may arrange so that the line of the polarization film 4B may be parallel substantially to the direction of a field of the body B front face of the car picturized by the image sensor 2 using polarization film 4B which has the layer of the transporence located in a line in the predetermined direction in the shape of a serial, or an opaque molecule like.

[0022] In this case, in the flat surface which carries out an abbreviation rectangular cross to the line F of polarization film 4B, incidence of the light Lr reflected on the front face of Body B is carried out to the polarization film 4B concerned from the slanting side to polarization film 4B. Therefore, polarization film 4B functions like a kind of bride, and attenuates the reflected light Lr concerned. On the other hand, as compared with the above-mentioned reflected light Lr, since incidence of the light Ld which carries out direct incidence to image pick-up side 2a will be carried out to polarization film 4B with an abbreviation vertical position to the direction of a field of polarization film 4B, the attenuation at the time of transparency has it. [little] Therefore, the scene by direct light other than the reflected light Lr etc. is picturized satisfactory at all.

[0023] Therefore, also in the case of this modification 1, the reflected light Lr in the front face of Body B can be attenuated, and the effect of the reflected light Lr from the front face of the body B of the car in an image pick-up image can be controlled.

[0024] Moreover, the above-mentioned circumference image pick-up equipment 1 for cars is applicable also to the image pick-up equipment 30 which picturizes a car circumference image including the front face of the car of Car A through the optical-system reflective means of prism object 40 grade like the modification 2 shown in drawing 4 and drawing 5.

[0025] That is, this image pick-up equipment 30 is the both-sides section of Car A, and it is prepared in cross-direction pars intermedia, and comes to carry out hold arrangement of an image sensor 34 and the prism object 40 of the shape of a cross-section abbreviation 2 equilateral-triangle-like column into the case object 32.

[0026] Hold arrangement of said prism object 40 is carried out with the position in which the base side was made to counter said image pick-up side 34a.

[0027] And it is reflected by backside [the prism object 40] side-face 40b, and the light La which passed window part 33a by the side of before drawing 4, and advanced into the case object 32 is guided at image pick-up side 34a. It is reflected by before [the prism object 40] side side-face 40a, and the light Lb which passed window part 33b on the backside, and advanced into the case object 32 is guided at image pick-up side 34a, and it is constituted so that both scenes can picturize simultaneously among the both-sides sections of Car A with the single image sensor 34 by this approximately. In addition, Body B is contained in the image pick-up image before and behind the car A by the image sensor 34, respectively.

[0028] In this case, the polarization member 45 is arranged in the middle of the optical path which the light La and Lb reflected with Body B will carry out incidence to the prism object 40. The polarization member 45 is arranged by each window parts 33a and 33b of the case object 32 in this modification. He is trying for the polarization direction of each polarization member 45 to serve as a perpendicular (for the polarization direction to be parallel in the direction of space of drawing 3) substantially to the oscillating direction of S polarization component of the reflected lights La and Lb like the gestalt of the above-mentioned implementation.

[0029] With the image pick-up equipment concerning this modification 2 as well as the gestalt of the above-mentioned implementation, the reflected lights La and Lb can be reduced and the effect of the reflected lights La and Lb from the front face of the body B of the car in an image pick-up image can be controlled.

[0030] In addition, even if it makes it the polarization direction of the polarization member 45 and the direction of a field of the body B front face of the car picturized by the image sensor 34 be parallel substantially like the above-mentioned modification 1, similarly, the reflected lights La and Lb can be reduced and the effect of the reflected lights La and Lb from the front face of the body B of the car in an image pick-up image can be controlled.

[0031]

[Effect of the Invention] Since the polarization member is arranged in the middle of the optical path which the light reflected on the surface of the car will carry out incidence to the image pick-up side of an image sensor according to the circumference image pick-up equipment for cars according to claim 1 to 4 constituted as mentioned above, in an image pick-up image, the effect of the reflected light from the front face of a car can be controlled.

[0032] Moreover, since the polarization direction of said polarization member is arranged along the direction which decreases S polarization component of said reflected light the place whose principal component of light reflected on the surface of the car is S polarization component according to claim 2 or the circumference image pick-up equipment for cars according to claim 3, Namely, since the oscillating direction of S polarization component of the light which it will be reflected on the front face of the polarization direction and a car, and will carry out incidence to said image pick-up side intersects perpendicularly substantially or the polarization direction and the direction of a field of the front face of the car picturized by the image sensor lie at right angles substantially, Said reflected light can be attenuated and the effect of the reflected light from the front face of the car in an image pick-up image can be controlled.

[0033] In addition, also when picturizing the car circumference image according to claim 4 with which an image sensor

includes the front face of the car of a car through an optical-system reflective means like, the reflected light by the front face of a car can be reduced similarly, and the effect of the reflected light from the front face of a car can be controlled in an image pick-up image.

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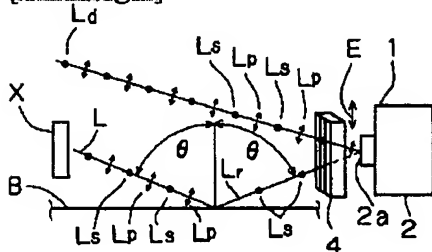
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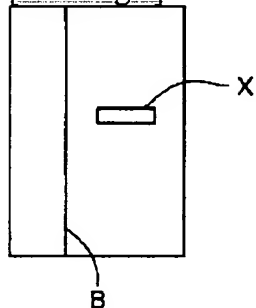
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DRAWINGS

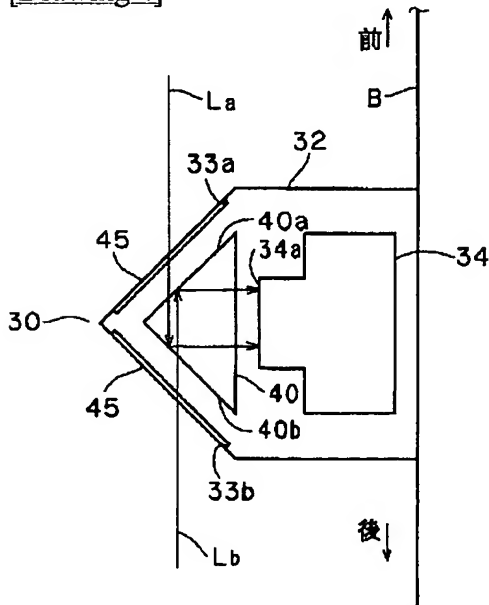
[Drawing 1]



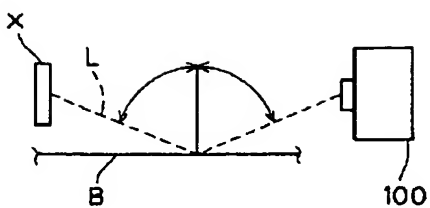
[Drawing 2]



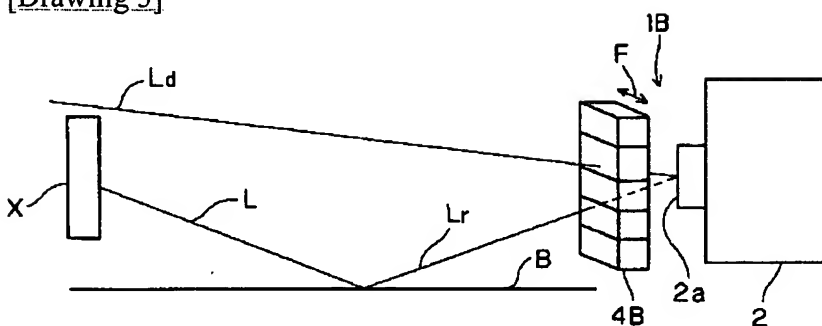
[Drawing 4]



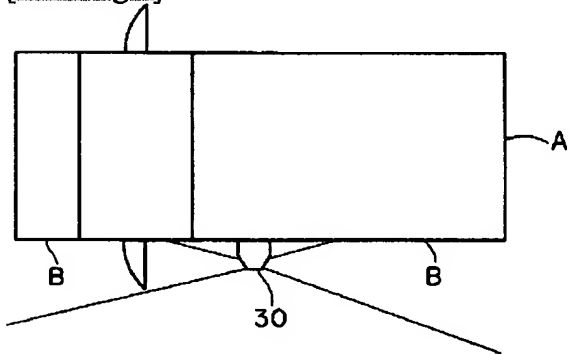
[Drawing 8]



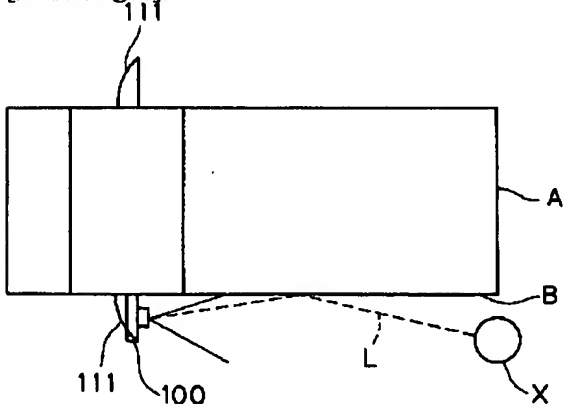
[Drawing 3]



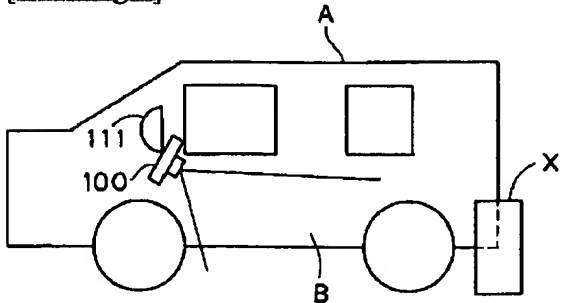
[Drawing 5]



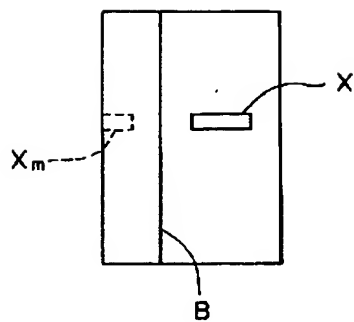
[Drawing 6]



[Drawing 7]



[Drawing 9]



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